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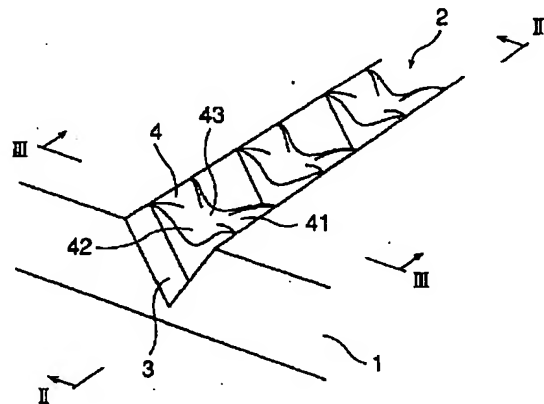
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(54) 【発明の名称】 折り曲げ罫線入りプラスチックシートおよびその製造方法ならびに折り曲げ罫線刃

(57) 【要約】

【構成】 折り曲げ罫線入りプラスチックシートにおいて、前記折り曲げ罫線2は長さ方向に多数の深溝部3と延伸部4とを交互に設けたことを特徴とする折り曲げ罫線入りプラスチックシートである。

【効果】 特に延伸部4の効果により、本発明の折り曲げ罫線入りシートは折り曲げ罫線2全体の平均肉厚を薄くしても罫線部からの破れや破損のない折り曲げ性良好な罫線が得られ、細くてシャープな折り曲げ部が得られる。



## 【特許請求の範囲】

【請求項1】 折り曲げ罫線入りプラスチックシートにおいて、前記折り曲げ罫線は長さ方向に多数の深溝部と延伸部とを交互に設けたことを特徴とする折り曲げ罫線入りプラスチックシート。

【請求項2】 深溝部の長さはシート肉厚の0.3倍～3.0倍であり、深溝部の深さはシート肉厚の0.5倍～1.0倍であり、深溝部の開口幅はシート肉厚の0.3倍～3.0倍であり、延伸部の長さはシート肉厚の0.3倍～3.0倍であり、延伸部の厚さはシート肉厚より薄くなっていることを特徴とする請求項1に記載の折り曲げ罫線入りプラスチックシート。

【請求項3】 延伸部の形状が鞍形状の上面部を持つことを特徴とする請求項1に記載の折り曲げ罫線入りプラスチックシート。

【請求項4】 刃先が長さ方向に凹凸形状を有する折り曲げ罫線刃をプラスチックシートに押し付けて刃先の凸部を食い込ませて押し広げながら深溝部を形成するとともに、前記押し広げにより刃先の凸部の間のプラスチックシート部分を幅方向に延伸して、深溝部の間に延伸部を形成することを特徴とする折り曲げ罫線入りプラスチックシートの製造方法。

【請求項5】 刃先が長さ方向に凹凸形状を有し、刃先の凸部の長さが、シート肉厚の0.3～3.0倍、刃先の凹部の長さが、シート肉厚の0.3～3.0倍であり、刃先の凸部の食い込み高さがシート肉厚の0.5倍以上でかつ、絶対高さが前記食い込み高さより大きく、刃先の凸部の食い込み最大幅がシート厚みの0.3～3.0倍である折り曲げ罫線刃。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、折り曲げ罫線入りプラスチックシートおよびその製造方法ならびに折り曲げ罫線刃に関する。

【0002】

【従来の技術】プラスチック製の組み立てケースの素材となる折り曲げ罫線入りプラスチックシートは、平坦なプラスチックシートの曲げ部分に溝状の折り曲げ罫線を設けて、この部分から曲げやすくしている。従来の折り曲げ罫線2は、図11に斜視図を示すように、1本の溝部261、2本の溝部262、263あるいは長手方向に深溝部264、浅溝部265と2段の深さとした溝部として曲げ時の応力を少なくする構造のもの、あるいは加熱した罫線刃を使用したり、高周波でプラスチックシートの曲げ部分を加熱しながら押圧して折り曲げ罫線を設ける方法などがある。

【0003】

【発明が解決しようとする課題】しかし、前者の1本、2本あるいは2段の深さとしたいずれの溝部もこれら溝部の形状に対応する刃先形状を有する罫線刃でシート全

体を強く押圧して溝部を薄くしているため罫線部分のプラスチック内の分子は強い押圧により圧縮されて、その部分の物性強度が下がってしまい、あまり深く罫線を入れられなかったり、深く入れた割には柔らかく曲げられない欠点がある。

【0004】さらに高圧で全体に押圧して加工するために多数の折り曲げ罫線や輪郭の打ち抜き加工を同時に行う場合大きな押圧力を必要とするとともに、折り曲げ罫線間のプラスチックシートが反ってしまうという問題があり、特にその後の工程で折り曲げて貼り加工等をする場合1枚1枚うまく送付等ができず自動化が計れない欠点がある。

【0005】また、後者の加熱した罫線刃や、高周波を使用する方法では、高速で加工するのが難しかったり熱管理の面からも平均的に加熱できず、ケース全体の罫線深さを均一にすることが困難であり、シート材質によっては物性が加熱により悪化する場合もある。

【0006】

【課題を解決するための手段】本発明は、上記問題点を解決するために考え出された全く新しい構造のもので、折り曲げ罫線入りプラスチックシートにおいて、前記折り曲げ罫線は長さ方向に多数の深溝部と延伸部とを交互に設けたことを特徴とする折り曲げ罫線入りプラスチックシートであり、特に延伸部の効果により、本発明の折り曲げ罫線入りシートは罫線部の全体の平均肉厚を薄くしても罫線部からの破れや破損のない折り曲げ性良好な罫線が得られる。

【0007】また、深溝部の長さはシート肉厚の0.3倍～3.0倍であり、深溝部の深さはシート肉厚の0.5倍～1.0倍であり、深溝部の開口幅はシート肉厚の0.3倍～3.0倍であり、延伸部の長さはシート肉厚の0.3倍～3.0倍であり、延伸部の厚さはシート肉厚より薄くなっていることにより、折り曲げ易さと破れや破損の生じ難さとのバランスのとれた折り曲げ罫線入りプラスチックシートが得られる。

【0008】また、延伸部の形状が鞍形状の上面部を持つことにより、プラスチックシートを折り曲げ罫線から折り曲げた時に、各延伸部は角が丸まった状態で折れ曲がるので被服の繊維に引っ掛かるおそれがない。

【0009】そして、刃先が長さ方向に凹凸形状を有する折り曲げ罫線刃をプラスチックシートに押し付けて刃先の凸部を食い込ませて押し広げながら深溝部を形成するとともに、前記押し広げにより刃先の凸部の間のプラスチックシート部分を幅方向に延伸して、深溝部の間に延伸部を形成することを特徴とする折り曲げ罫線入りプラスチックシートの製造方法により、深溝部および延伸部を有する折り曲げ罫線が極めて容易に形成できる。

【0010】さらに、刃先が長さ方向に凹凸形状を有し、刃先の凸部の長さが、シート肉厚の0.3～3.0倍、刃先の凹部の長さが、シート肉厚の0.3～3.0

倍であり、刃先の凸部の食い込み高さがシート肉厚の0.5倍以上でかつ、絶対高さが前記食い込み高さより大きく、刃先の凸部の食い込み最大幅がシート厚みの0.3~3.0倍である折り曲げ野線刃は、優れた折り曲げ野線入りプラスチックシートを製造するのに適している。

【0011】以下図面により詳細に説明する。

【0012】図1は本発明の折り曲げ野線入りプラスチックシートの一例を示す斜視図、図2は図1のII-II線断面図、図3は図1のIII-III線断面図、図4は本発明の折り曲げ野線入りプラスチックシートの製造方法および折り曲げ野線刃を説明する正面断面図、図5は図4のV-V断面図、図6~図9は本発明の折り曲げ野線刃の他の例を示す側面断面図、図10は本発明の折り曲げ野線入りプラスチックシートからなる筒状体の一例を示す斜視図、図11は従来の折り曲げ野線入りプラスチックシートの一例を示す斜視図である。

【0013】本発明の折り曲げ野線入りプラスチックシートは、図1~図3に示すように折り曲げ野線入りプラスチックシート1において、前記折り曲げ野線2は長さ方向に多数の深溝部3と延伸部4とを交互に設けたことを特徴とする折り曲げ野線入りプラスチックシートである。

【0014】本発明においてプラスチックシート1は肉厚0.1~3.0mm程度のもので、材質は、ポリ塩化ビニル、ポリエチレンテレフタレート、ポリプロピレン、ポリスチレン、ポリカーボネート、ポリエチレン等々の単体や紙との複合材及びプラスチックと他プラスチックの複合材等からなる半硬質、硬質シートが使用できる。さらに不織布等も加工でき、要するに延伸可能であればよい。

【0015】折り曲げ野線2を形成する深溝部3と延伸部4とは交互に形成され、深溝部3は折り曲げ野線2を柔らかくする作用があり、その長さL3を大きくすれば折り曲げ易くなる。延伸部4は前後を深溝部3により挟まれていて折り曲げ野線2の強度を保持する作用がある。

【0016】また、図2、図3に示すように溝部3の長さL3はシート肉厚Tの0.3倍~3.0倍であり、深溝部3の深さD3はシート肉厚Tの0.5倍~1.0倍であり、深溝部3の開口幅W3はシート肉厚Tの0.3倍~3.0倍であり、延伸部4の長さL4はシート肉厚Tの0.3倍~3.0倍であり、延伸部4の厚さT4はシート肉厚Tより薄くなっていることにより、折り曲げ易さと破れや破損の生じ難さのバランスがさらに向上する。

【0017】また、図1、図2に示すように延伸部4の形状が鞍形状の上面部4.1を持つことにより、この上面部4.1が折り曲げ外側にくるようにプラスチックシート1を折り曲げ野線2から折り曲げた時に、各延伸部4は

上面部4.1の前後の角4.2が丸まった状態で折れ曲がるので被服の繊維等に引っ掛かるおそれがないとともに、折り曲げの位置が鞍形状の中央の最薄部4.3の細い範囲に安定するので折り曲げ線が目立たないという作用がある。

【0018】図4~図5に示すように本発明の折り曲げ野線入りプラスチックシートを加工するためには、刃先が長さ方向に凹凸形状を有する折り曲げ野線刃5をプラスチックシート1に押し付けて刃先の凸部5.3を食い込ませて押し広げながら深溝部3を形成するとともに、前記押し広げにより刃先の凸部5.3の間のプラスチックシート部分1.4を幅方向に延伸して、深溝部3の間に延伸部4を形成することを特徴とする折り曲げ野線入りプラスチックシートの製造方法により、深溝部3および延伸部4を有する折り曲げ野線2が極めて容易に形成できる。

【0019】プラスチックシート1の下には鉄板等からなる受け台6を設置し、該プラスチックシート1の上方から、刃先が長さ方向に凹凸形状を有する折り曲げ野線刃5を押し付けることにより、折り曲げ野線2が得られる。

【0020】刃先の凸部5.3の食い込み最大幅W5.3および刃先の凸部5.3の食い込み高さH5.3が大きくなると深溝部3の上面部の開口幅W3が大きくなり、延伸部4が大きく引き伸ばされ、図2におけるその厚さT4は小さくなる。

【0021】刃先の凸部5.3の食い込み最大幅W5.3があまりに小さすぎて延伸部4が引き伸ばされずその厚さT4が小さくならないと、折り曲げにくい。一方、あまりに大きくすると押圧加工時必要以上の圧力がシートに加わり、野線部が硬くなったり、延伸部4の延伸率が上がりすぎて上面部4.1にひび割れが発生する場合がある。

【0022】引き伸ばされた延伸部4の上面部4.1の形状は鞍形状とすることができる。これは、刃先の凸部5.3の食い込みによる押し広げにより刃先の凸部5.3の間のプラスチックシート部分1.4は、幅方向に延伸されるだけではなく、中央付近では凸部先端により前後方向にも肉が引き摺られるため、一般的にプラスチックは延伸すると肉厚は薄くなり、より折り曲げ易くなり、延伸により引張強度が向上して折り曲げ野線2が破れにくくなる。

【0023】さらに野線刃5は、刃先の凸部5.3が深溝部3を押圧するだけで、刃先の凹部5.4は延伸部4にはふれずに折り曲げ野線2を形成できるから、折り曲げ野線2は部分的にしか押圧されることがないので、小さな押圧力で加工できるとともに、折り曲げ野線2間のプラスチックシート1が押圧応力によって反るようなことがない。

【0024】プラスチックシート1の厚い部分は刃先の

凸部53が深くはいるとともに押し広げ効果も大きく延伸部4の肉厚が小さくなって折り曲げやすくなる傾向があるので、プラスチックシート1の厚さにむらがあっても野線の曲げ易さが比較的安定する構造である。

【0025】刃先の長さ方向に凹凸形状を有し、刃先の凸部53の長さL53が、シート肉厚Tの0.3~3.0倍、刃先の凹部54の長さL54が、シート肉厚Tの0.3~3.0倍であり、刃先の凸部53の食い込み高さH53がシート肉厚Tの0.5倍以上でかつ、絶対高さH530が食い込み高さH53よりも大きく、刃先の凸部53の食い込み最大幅W53がシート厚みTの0.3~3.0倍である折り曲げ野線刃5は、優れた折り曲げ野線入りプラスチックシートを製造するのに適している。

【0026】刃先の凸部53の食い込み高さH53がシート肉厚Tの0.5倍以上であれば、折り曲げ易いとともに、押し広げにより延伸部4を形成することができる。また、刃先の凸部53の絶対高さH530が食い込み高さH53よりも大きいので、食い込み高さH53まで押圧した場合も、刃先の凹部54の底面541が触れることなく単に押し広げにより延伸部4を形成することができるので、延伸部4には刃先による押圧力が加わらないようにできる。この場合、食い込み高さH53を大きく取って、刃先の凸部53をシート肉厚T全体にわたって食い込ませて開孔することもでき、一方、密封性を要求する場合は図4~図5のように残肉部13を残す方法もある。

【0027】刃先の凹部54の長さL54が、シート肉厚Tの3.0倍より大きくしていくと刃先の凸部53による押し広げ効果が延伸部の中央内部まで発揮できず、延伸されないでシート肉厚Tより薄くならない部分が生まれる。一方、0.3倍以下だと押し広げによる延伸度合いが高く、延伸部4の上面にひび割れが発生する場合もある。

【0028】刃先の凸部53の食い込み最大幅W53がシート厚みTの0.3~3.0倍であるのが望ましく、0.3倍以下だと押し広げの程度が小さくて延伸部4があまり薄くならず、3.0倍を越えると延伸部4の上面にひび割れが生ずるおそれがある。

【0029】尚、野線刃5の刃先の凸部53の横断面の形状は図5に示すもののほか、図6~図9に示すような先端の形状でもよい。

【0030】

【実施例】プラスチックシート1としては厚さ0.25mmの非晶性のポリエチレンテレフタレートを使用、野線刃5としては図4、図5に示す刃先の凸部53の長さL53および刃先の凹部54の長さL54が共に0.25mm、刃先形状としては刃先角度Dが約75°のV形であり刃先の凸部53の絶対高さH530が0.3mmであって、食い込み高さH53が0.24mmのとき刃

先の凸部53の食い込み最大幅W53が約0.19mmとなるものを使用した。

【0031】上記野線刃5を用いて、鉄板6上にプラスチックシート1を置き、その上方から野線刃5を刃先の凸部53を食い込ませて押し広げながら食い込み高さH53が0.24mmの部分まで押圧して、図2に示すように深溝部3の深さD3が0.24mm、深溝部3の開口幅W3は0.19mmの折り曲げ野線2を形成したところ、延伸部4はその上面部41は鞍形状となり延伸部4の中央部43の厚さT4は0.21mmとなった。

【0032】こうして得られた折り曲げ野線入りプラスチックシートは、折り曲げ野線2から180度折り畳んでみると容易に折り曲げることができるとともに、この状態から360度反対側に折り畳むという折り返しテストを20回繰り返して行なっても折り曲げ野線2からの破損もなく、折り曲げ易さと強度のバランスに優れたものであった。

【0033】折り曲げ易さを実用的に評価するため、たとえば図10に示すように、プラスチックシート1に折り曲げ野線2を形成するとともに所定の輪郭に打ち抜いたブランクシートの両端を、糊代110によって接着して平たく押し潰し、高さAが100mm、幅Bが50mm、厚さCが20mmの筒状体10を造り、自動製函機（（株）オーエム製作所 VCV型）を用いて、潰した筒状体10を引き起こすとともにサイドフラツプ111および蓋フラツプ112を折り曲げて閉止し箱体を組み立てるという製函テストを行った結果、毎分60個の製函が可能であった。なお野線を入れた側を筒状体10の内側としてもあるいは外側としても同様の結果が出た。

【0034】

【発明の効果】本発明は、折り曲げ野線入りプラスチックシートにおいて、前記折り曲げ野線は長さ方向に多数の深溝部と延伸部とを交互に設けたことを特徴とする折り曲げ野線入りプラスチックシートであり、特に延伸部の効果により、本発明の折り曲げ野線入りシートは野線部の全体の平均肉厚を薄くしても野線部からの破れや破損のない折り曲げ性良好な野線が得られ、細くてシャープな折り曲げ部が得られる。

【0035】また、深溝部の長さはシート肉厚の0.3倍~3.0倍であり、深溝部の深さはシート肉厚の0.5倍~1.0倍であり、深溝部の開口幅はシート肉厚の0.3倍~3.0倍であり、延伸部の長さはシート肉厚の0.3倍~3.0倍であり、延伸部の厚さはシート肉厚より薄くなっていることにより、折り曲げ易さと破れや破損の生じ難さとのバランスのとれた折り曲げ野線入りプラスチックシートが得られる。

【0036】また、延伸部の形状が鞍形状の上面部を持つことにより、プラスチックシートを折り曲げ野線から折り曲げた時に、各延伸部は角が丸まった状態で折れ曲がるので被服の繊維に引っ掛かるおそれがなく、手触り

も良好である。

【0037】そして、刃先が長さ方向に凹凸形状を有する折り曲げ罫線刃をプラスチックシートに押し付けて刃先の凸部を食い込ませて押し広げながら深溝部を形成するとともに、前記押し広げにより刃先の凸部の間のプラスチックシート部分を幅方向に延伸して、深溝部の間に延伸部を形成することを特徴とする折り曲げ罫線入りプラスチックシートの製造方法により、深溝部および延伸部を有する折り曲げ罫線が極めて容易に形成でき、また折り曲げ易さや強度の調整が容易で、加工時に強い押圧力を必要としないため、多数の罫線刃を一度に使用したり罫線刃と輪郭打抜刃とを一つの押圧型に取り付けて大量に加工でき、罫線刃の高さが同一寸法で加工出来るため従来刃の様に別々の高さ調整を必要としないため大幅な調整作業の合理化が計れ、罫線刃の精度も低くてもよい。

【0038】さらに、刃先が長さ方向に凹凸形状を有し、刃先の凸部の長さが、シート肉厚の0.3～3.0倍、刃先の凹部の長さが、シート肉厚の0.3～3.0倍であり、刃先の凸部の食い込み高さがシート肉厚の0.5倍以上であり、刃先の凸部の食い込み最大幅がシート厚みの0.3～3.0倍である折り曲げ罫線刃は、優れた折り曲げ罫線入りプラスチックシートを製造するのに適している。

【図面の簡単な説明】

【図1】本発明の折り曲げ罫線入りプラスチックシートの一例を示す斜視図

【図2】図1のII-II線断面図

【図3】図1のIII-III線断面図

【図4】本発明の折り曲げ罫線入りプラスチックシートの製造方法および折り曲げ罫線刃を説明する正面断面図

【図5】図4のV-V断面図

\*【図6】本発明の折り曲げ罫線刃の他の例を示す側面断面図

【図7】本発明の折り曲げ罫線刃の他の例を示す側面断面図

【図8】本発明の折り曲げ罫線刃の他の例を示す側面断面図

【図9】本発明の折り曲げ罫線刃の他の例を示す側面断面図

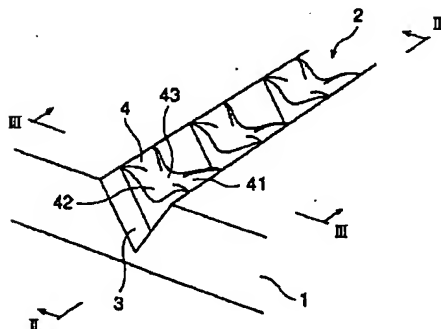
【図10】本発明の折り曲げ罫線入りプラスチックシートからなる筒状体の一例を示す斜視図

【図11】従来の折り曲げ罫線入りプラスチックシートの一例を示す斜視図

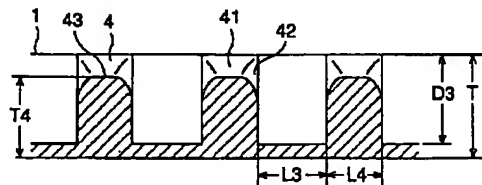
【符号の説明】

- 1 プラスチックシート
- 2 折り曲げ罫線
- 3 深溝部
- L3 深溝部の長さ
- D3 深溝部の深さ
- W3 深溝部の開口部
- 4 延伸部
- 41 上面部
- L4 延伸部の長さ
- 5 罫線刃
- 53 刃先の凸部
- L53 刃先の凸部の長さ
- H53 刃先の凸部の食い込み高さ
- H530 刃先の凸部の絶対高さ
- W53 刃先の凸部の食い込み最大幅
- 54 刃先の凹部
- L54 刃先の凹部の長さ
- T シート肉厚
- \* T4 延伸部の厚さ

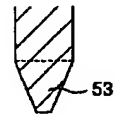
【図1】



【図2】



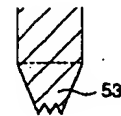
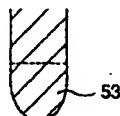
【図7】



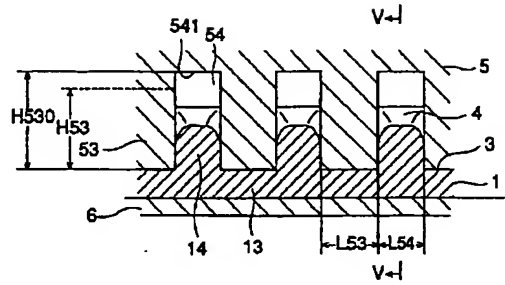
【図6】

【図8】

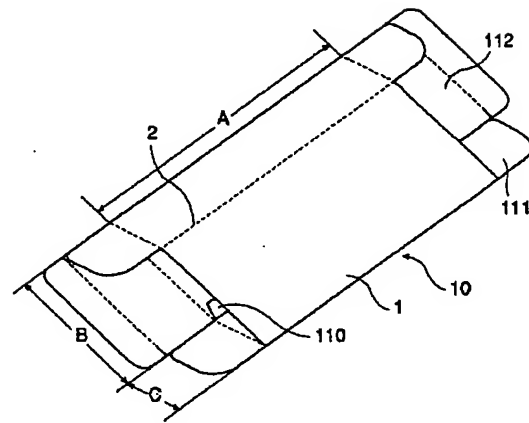
【図9】



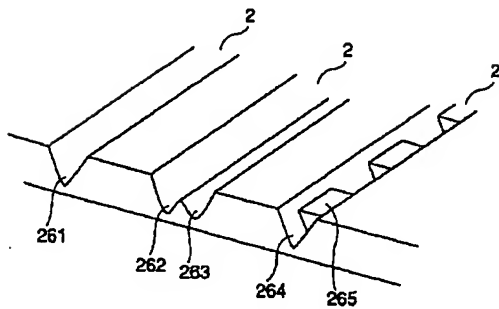
【圖4】



【圖 10】



【圖 11】



【公報種別】特許法第17条の2の規定による補正の掲載  
 【部門区分】第2部門第4区分  
 【発行日】平成10年(1998)8月18日

【公開番号】特開平8-39661  
 【公開日】平成8年(1996)2月13日  
 【年通号数】公開特許公報8-397  
 【出願番号】特願平6-174527  
 【国際特許分類第6版】

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 【F1】  
 B29C 53/06

【手続補正書】

【提出日】平成8年11月29日  
 【手続補正2】

【補正対象書類名】明細書  
 【補正対象項目名】特許請求の範囲  
 【補正方法】変更  
 【補正内容】  
 【特許請求の範囲】

【請求項1】 折り曲げ野線入りプラスチックシートにおいて、前記折り曲げ野線は長さ方向に多数の深溝部と延伸部とを交互に設けたことを特徴とする折り曲げ野線入りプラスチックシート。

【請求項2】 深溝部の長さはシート肉厚の0.3～3.0倍であり、深溝部の深さはシート肉厚の0.5～1.0倍であり、深溝部の開口幅はシート肉厚の0.3～3.0倍であり、延伸部の長さはシート肉厚の0.3～3.0倍であり、延伸部の厚さはシート肉厚より薄くなっていることを特徴とする請求項1に記載の折り曲げ野線入りプラスチックシート。

【請求項3】 延伸部の形状が鞍形状の上面部を持つことを特徴とする請求項1に記載の折り曲げ野線入りプラスチックシート。

【請求項4】 刃先が長さ方向に凹凸形状を有する折り曲げ野線刃をプラスチックシートに押し付けて刃先の凸部を食い込ませて押し広げながら深溝部を形成するとともに、前記押し広げにより刃先の凸部の間のプラスチックシート部分を幅方向に延伸して、深溝部の間に延伸部を形成することを特徴とする折り曲げ野線入りプラスチックシートの製造方法。

【請求項5】 刃先が長さ方向に凹凸形状を有し、刃先の凸部の長さが、シート肉厚の0.3～3.0倍、刃先の凹部の長さが、シート肉厚の0.3～3.0倍であり、刃先の凸部の食い込み高さがシート肉厚の0.5倍以上でかつ、絶対高さが前記食い込み高さより大きく、刃先の凸部の食い込み最大幅がシート厚みの0.3～3.0倍であるプラスチックシートの折り曲げ野線刃。

【請求項6】 請求項1～3の何れかに記載のプラスチック

シートを所定の輪郭に打ち抜き、これを折り曲げて組み立ててなるプラスチック製ケース。

【手続補正3】

【補正対象書類名】明細書  
 【補正対象項目名】0007  
 【補正方法】変更  
 【補正内容】

【0007】また、深溝部の長さはシート肉厚の0.3～3.0倍であり、深溝部の深さはシート肉厚の0.5～1.0倍であり、深溝部の開口幅はシート肉厚の0.3～3.0倍であり、延伸部の長さはシート肉厚の0.3～3.0倍であり、延伸部の厚さはシート肉厚より薄くなっていることにより、折り曲げ易さと破れや破損の生じ難さとのバランスのとれた折り曲げ野線入りプラスチックシートが得られる。

【手続補正4】

【補正対象書類名】明細書  
 【補正対象項目名】0011  
 【補正方法】変更  
 【補正内容】

【0011】上記構成の折り曲げ野線入りプラスチックシートはプラスチック製の組み立てケースの素材となり、プラスチックシートを糊代とフラップを有する所定の輪郭のブランクシートに打ち抜き、このブランクシートを折り曲げるとともに両端部を糊代により接着し、フラップを折り曲げて閉じればケースとなる。以下、図面により詳細に説明する。

【手続補正5】

【補正対象書類名】明細書  
 【補正対象項目名】0016  
 【補正方法】変更  
 【補正内容】

【0016】また、図2、図3に示すように深溝部3の長さL3はシート肉厚Tの0.3～3.0倍であり、深溝部3の深さD3はシート肉厚Tの0.5～1.0倍であり、深溝部3の開口幅W3はシート肉厚Tの0.3～

3. 0倍であり、延伸部4の長さL4はシート肉厚Tの0.3~3.0倍であり、延伸部4の厚さT4はシート肉厚Tよりも薄くなっていることにより、折り曲げ易さと破れや破損の生じ難さのバランスがさらに向上する。

【手続補正6】

【補正対象書類名】明細書

【補正対象項目名】0035

【補正方法】変更

【補正内容】

【0035】また、深溝部の長さはシート肉厚の0.3~3.0倍であり、深溝部の深さはシート肉厚の0.5~1.0倍であり、深溝部の開口幅はシート肉厚の0.3~3.0倍であり、延伸部の長さはシート肉厚の0.3~3.0倍であり、延伸部の厚さはシート肉厚よりも薄くなっていることにより、折り曲げ易さと破れや破損の生じ難さとのバランスのとれた折り曲げ野線入りブラ

スチックシートが得られる。

【手続補正7】

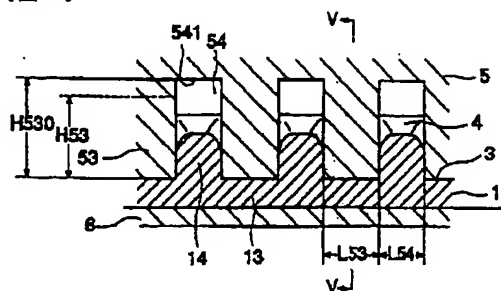
【補正対象書類名】図面

【補正対象項目名】図4

【補正方法】変更

【補正内容】

【図4】





## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MITSUBISHI PLASTICS IND LTD

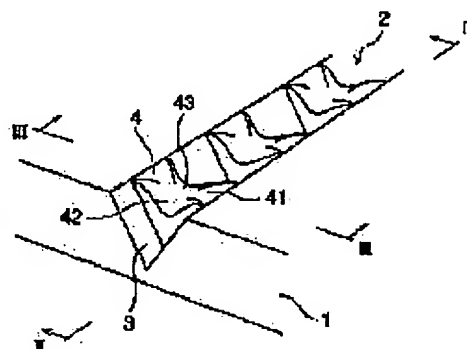
(22)Date of filing : 26.07.1994

(72)Inventor : HASHIMOTO TADASHI

**(54) BENDING RULE APPLIED PLASTIC SHEET, PRODUCTION THEREOF AND BENDING RULE BLADE****(57)Abstract:**

**PURPOSE:** To obtain a rule good in bendability not generating the rupture or damage in a plastic sheet from a rule part even when the average thickness of the whole of the rule part is reduced, and a fine and sharp bending part by alternately providing a large number of deep groove parts and stretched parts to a bending rule in a longitudinal direction.

**CONSTITUTION:** A plastic sheet 1 contains a bending rule 2. A large number of deep groove parts 3 and stretched parts 4 are alternately provided to the bending rule 2 in a longitudinal direction. Herein, the length of each of the deep groove parts 3 is 0.3-3.0 times the thickness of the sheet and the depth thereof is 0.5-1.0 times the thickness of the sheet. The length of each of the stretched parts 4 is 0.3-3.0 times the thickness of the sheet and the thickness thereof is less than that of the sheet. By this constitution, the plastic sheet containing the bending rule well-balanced between bending easiness and difficulty in generating rupture or a damage is obtained.

**LEGAL STATUS**

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[Date of sending the examiner's decision of rejection]

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[Date of final disposal for application]

[Patent number] 2898884

[Date of registration] 12.03.1999

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] It is the sheet plastic containing a bending ruled line characterized by said bending ruled line preparing much deep grooves and the extension sections in the die-length direction by turns in the sheet plastic containing a bending ruled line.

[Claim 2] the die length of a deep groove -- a sheet -- 0.3 times to 3.0 thick times -- it is -- the depth of a deep groove -- a sheet -- 0.5 times to 1.0 thick times -- it is -- the aperture width of a deep groove -- a sheet -- 0.3 times to 3.0 thick times -- it is -- the die length of the extension section -- a sheet -- 0.3 times to 3.0 thick times -- it is -- the thickness of the extension section -- a sheet -- the sheet plastic containing a bending ruled line according to claim 1 characterized by being thickly thinner.

[Claim 3] The sheet plastic containing a bending ruled line according to claim 1 characterized by the configuration of the extension section having the saddle shape-like top-face section.

[Claim 4] while the edge of a blade pushes against a sheet plastic the bending ruled line cutting edge which has the shape of toothing in the die-length direction, makes the heights of the edge of a blade eat away, extends and forming a deep groove -- said push -- being large -- the manufacture approach of the sheet plastic containing a bending ruled line characterized by extending the sheet-plastic part between the heights of the edge of a blade crosswise, and forming the extension section between deep grooves.

[Claim 5] the edge of a blade -- the die-length direction -- the shape of toothing -- having -- the die length of the heights of the edge of a blade -- a sheet -- the die length of the crevice of 0.3 to 3.0 thick times, and the edge of a blade -- a sheet -- 0.3 to 3.0 thick times -- it is -- the interlocking height of the heights of the edge of a blade -- a sheet -- 0.5 or more thick times -- and the bending ruled line cutting edge whose interlocking maximum width of the heights of the edge of a blade height is larger than said interlocking height absolutely, and is 0.3 to 3.0 times the sheet thickness.

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[Translation done.]

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2.\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention is bent in the sheet plastic containing a bending ruled line, and its manufacture approach row, and relates to a ruled line cutting edge.

[0002]

[Description of the Prior Art] The sheet plastic containing a bending ruled line used as the material of the assembly case made from plastics forms a groove bending ruled line in the bending part of a flat sheet plastic, and from this part, it is [ a ruled line ] bending-easy and it is carrying out it. The conventional bending ruled line 2 has a method of pressing and bending and forming a ruled line etc., using the thing or the heated ruled line cutting edge of the structure which lessens stress at the time of bending as a slot made into a deep groove 264, a shallow groove part 265, and two steps of depths for the slot 262,263 of one slots [ 261 or 2 ], or a longitudinal direction, or heating the bending part of a sheet plastic by high frequency, as a perspective view is shown in drawing 11 .

[0003]

[Problem(s) to be Solved by the Invention] However, since any slot made into 1 of the former, 2, or two steps of depths presses the whole sheet strongly with the ruled line cutting edge which has an edge-of-a-blade configuration corresponding to the configuration of these slots and makes the slot thin, the molecule in the plastics of a ruled line part is compressed by strong press. The physical-properties reinforcement of the part falls, and a ruled line cannot be put in not much deeply, or although put in deeply, there is a fault which is not bent softly.

[0004] In order to press and process it into the whole with high pressure furthermore, when performing punching processing of many bending ruled lines or a profile to coincidence, while needing big thrust, there is a problem that the sheet plastic between bending ruled lines will curve, and when bending and sticking especially at a subsequent process and carrying out processing etc., there is a fault which one sending [ one ] etc. cannot be performed well and cannot measure automation.

[0005] Moreover, by the ruled line cutting edge which the latter heated, and the approach of using a RF, it is difficult for processing it at high speed to be able to carry out in difficulty, and to be unable to cut, to be unable to heat on the average from the field of heat control, but to make the ruled line depth of the whole case into homogeneity, and physical properties may get worse with heating depending on the sheet quality of the material.

[0006]

[Means for Solving the Problem] It is the thing of the completely new structure invented in order that this invention might solve the above-mentioned trouble. In the sheet plastic containing a bending ruled line, said bending ruled line is a sheet plastic containing a bending ruled line characterized by preparing much deep grooves and the extension sections in the die-length direction by turns. Especially according to the effectiveness of the extension section Even if the sheet containing a bending ruled line of this invention makes thin average wall thickness of the whole ruled line section, a ruled line with good bending nature without the tear and breakage from the ruled line section is obtained.

[0007] Moreover, the die length of a deep groove is 3.0 times [ 0.3 times to ] the sheet thickness, and the depth of a deep groove is 1.0 times [ 0.5 times to ] the sheet thickness. the aperture width of a deep groove — a sheet — 0.3 times to 3.0 thick times — it is — the die length of the extension section — a sheet — 0.3 times to 3.0 thick times — it is — the thickness of the extension section — a sheet — by being thickly thinner The sheet plastic containing a bending ruled line which maintained balance with the ease of bending and the difficulty of being generated of a tear or breakage is obtained.

[0008] Moreover, when the configuration of the extension section has the saddle shape-like top-face section, and a sheet plastic is bent and it bends from a ruled line, since each extension section bends after the angle has been round, it does not have a possibility that it may be caught in the fiber of clothing.

[0009] And while the edge of a blade pushes against a sheet plastic the bending ruled line cutting edge which has the shape of toothing in the die-length direction, makes the heights of the edge of a blade eat away, extends and forming a deep groove said push — being large — the sheet-plastic part between the heights of the edge of a blade is extended crosswise, and the bending ruled line which has a deep groove and the extension section can form very easily by the manufacture approach of the sheet plastic containing a bending ruled line characterized by forming the extension section between deep grooves.

[0010] The edge of a blade has the shape of toothing in the die-length direction. The die length of the heights of the edge of a blade Furthermore, 0.3 to 3.0 times of sheet thickness, the die length of the crevice of the edge of a blade — a sheet — 0.3 to 3.0 thick times — it is — the interlocking height of the heights of the edge of a blade — a sheet — 0.5 or more thick times — and Height is larger than said interlocking height absolutely, and the bending ruled line cutting edge whose interlocking maximum width of the heights of the edge of a blade is 0.3 to 3.0 times the sheet thickness is suitable for outstanding bending and manufacturing the sheet plastic containing a ruled line.

[0011] A drawing explains to a detail below.

[0012] The perspective view in which drawing 1 shows an example of the sheet plastic containing a bending ruled line of this invention, Drawing 2 is the II-II line sectional view of drawing 1 , and drawing 3 is III-III of drawing 1 . Line sectional view, The transverse-plane sectional view where drawing 4 explains the manufacture approach of the sheet plastic containing a bending ruled line of this invention, and a bending ruled line cutting edge, Drawing 5 is V-V of drawing 4 . A sectional view, the side-face sectional view in which drawing 6 - drawing 9 show other examples of the bending ruled line cutting edge of this invention, The perspective view and drawing 11 which show an example of the tube-like object with which drawing 10 consists of a sheet plastic containing a bending ruled line of this invention are the perspective view showing an example of the conventional sheet plastic containing a bending ruled line.

[0013] It is the sheet plastic containing a bending ruled line characterized by having bent the sheet plastic containing a bending ruled line of this invention as shown in drawing 1 - drawing 3 , and said bending ruled line 2 preparing much deep grooves 3 and the extension sections 4 in the die-length direction by turns in the sheet plastic 1 containing a ruled line.

[0014] In this invention, a sheet plastic 1 is a thing with a thickness of about 0.1-3.0mm, and the half-hard and the hard sheet which consist of simple substances of \*\*, such as a polyvinyl chloride, polyethylene terephthalate, polypropylene, polystyrene, a polycarbonate, and polyethylene, composite with paper, the composite of plastics and other plastics, etc. can be used for the quality of the material. Furthermore a nonwoven fabric etc. is processible, and it is good if extension is possible in short.

[0015] It is formed by turns and a deep groove 3 has the operation which makes the bending ruled line 2 soft, and if the die length L3 is enlarged, it will become easy to bend the deep groove 3 and the extension section 4 which form the bending ruled line 2. The extension section 4 has the operation which the deep groove 3 faces across order, bends, and holds the reinforcement of a ruled line 2.

[0016] Moreover, as shown in drawing 2 and drawing 3 , the die length L3 of a slot 3 is 3.0 times [ 0.3 times to ] the sheet thickness T. The depth D3 of a deep groove 3 is 1.0 times [ 0.5 times

to ] the sheet thickness  $T$ , and aperture-width  $W3$  of a deep groove 3 is 3.0 times [ 0.3 times to ] the sheet thickness  $T$ . The die length  $L4$  of the extension section 4 is 3.0 times [ 0.3 times to ] the sheet thickness  $T$ , and thickness  $T$  four of balance of the difficulty of being generated of the ease of bending, a tear, or breakage of the extension section 4 improves further by being thinner than the sheet thickness  $T$ .

[0017] Moreover, as shown in drawing 1 and drawing 2, when the configuration of the extension section 4 has the saddle shape-like top-face section 41 When a sheet plastic 1 is bent and it bends from a ruled line 2 so that a surface part 41 may besides bend and it may come outside Since the location of bending is stabilized in the thin range of the thinnest part 43 of a saddle shape-like center, it has an operation that a bend line is not conspicuous, while it does not have a possibility that it may be caught in the fiber of clothing etc., since each extension section 4 bends after the angle 42 before and behind the top-face section 41 has been round.

[0018] As shown in drawing 4 - drawing 5, in order to process the sheet plastic containing a bending ruled line of this invention While the edge of a blade pushes against a sheet plastic 1 the bending ruled line cutting edge 5 which has the shape of toothing in the die-length direction, makes the heights 53 of the edge of a blade eat away, extends and forming a deep groove 3 said push — being large — by the manufacture approach of the sheet plastic containing a bending ruled line characterized by extending the sheet-plastic part 14 between the heights 53 of the edge of a blade crosswise, and forming the extension section 4 between deep grooves 3 The bending ruled line 2 which has a deep groove 3 and the extension section 4 can form very easily.

[0019] When the cradle 6 which consists of a griddle etc. is installed in the bottom of a sheet plastic 1 and the edge of a blade pushes the bending ruled line cutting edge 5 which has the shape of toothing in the die-length direction from the upper part of this sheet plastic 1, the bending ruled line 2 is obtained.

[0020] If the interlocking maximum width  $W53$  of the heights 53 of the edge of a blade and the interlocking height  $H53$  of the heights 53 of the edge of a blade become large, aperture-width  $W3$  of the top-face section of a deep groove 3 will become large, the extension section 4 is extended greatly and the thickness  $T$  four in drawing 2 becomes small.

[0021] It will be hard to bend, if the interlocking maximum width  $W53$  of the heights 53 of the edge of a blade is too small, the extension section 4 is not extended and the thickness  $T$  four does not become small. If it enlarges on the other hand too much, the pressure beyond the need will join a sheet at the time of press processing, the ruled line section may become hard, or the rate of extension of the extension section 4 increases too much, and a crack may occur in the top-face section 41.

[0022] The configuration of the top-face section 41 of the extended extension section 4 can be made into the shape of a saddle shape. push according [ this ] to interlocking of the heights 53 of the edge of a blade — being large — if the sheet-plastic part 14 between the heights 53 of the edge of a blade is because there is nothing and meat is dragged by the cross direction by the heights tip near a center only by being extended crosswise and plastics is generally extended — thickness — thin — becoming — more — bending — being easy — tensile strength improves by extension, it bends, and a ruled line 2 stops being torn easily

[0023] The sheet plastic 1 between the bending ruled lines 2 seems not to curve with press stress furthermore, while the ruled line cutting edge 5 is processible by small thrust since the heights 53 of the edge of a blade only press a deep groove 3, bend the crevice 54 of the edge of a blade, without touching the extension section 4, and can form a ruled line 2, and the bending ruled line 2 is not pressed partially.

[0024] It is the structure by which a bending [ of a ruled line ] easy is comparatively stabilized even if unevenness is in the thickness of a sheet plastic 1, since there is an inclination which it extends while, as for the thick part of a sheet plastic 1, the heights 53 of the edge of a blade enter deeply, and the thickness of the extension section 4 becomes small greatly [ effectiveness ], and becomes easy to bend.

[0025] The edge of a blade has the shape of toothing in the die-length direction. The die length  $L53$  of the heights 53 of the edge of a blade The die length  $L54$  of 0.3 to 3.0 times of the sheet

thickness  $T$  and the crevice 54 of the edge of a blade 0.3 to 3.0 times of the sheet thickness  $T$  — it is — the interlocking height  $H53$  of the heights 53 of the edge of a blade — 0.5 or more times of the sheet thickness  $T$  — and Height  $H530$  eats away absolutely, it is larger than height  $H53$ , and the bending ruled line cutting edge 5 whose interlocking maximum width  $W53$  of the heights 53 of the edge of a blade is 0.3 to 3.0 times the sheet thickness  $T$  is suitable for outstanding bending and manufacturing the sheet plastic containing a ruled line.

[0026] if the interlocking height  $H53$  of the heights 53 of the edge of a blade is 0.5 or more times of the sheet thickness  $T$ , while being easy to bend — push — being large — the extension section 4 can be formed. moreover — since it is larger than height  $H53$ , also when [ of the heights 53 of the edge of a blade ] height  $H530$  ate away absolutely, and it presses to the interlocking height  $H53$ , without the base 541 of the crevice 54 of the edge of a blade touches — only — push — being large — since the extension section 4 can be formed, the thrust by the edge of a blade can be prevented from joining the extension section 4 In this case, the large interlocking height  $H53$  is taken, the heights 53 of the edge of a blade can be made to be able to eat away over the whole sheet thickness  $T$ , and it can also puncture, and on the other hand, when requiring sealing performance, there is also a method of leaving the reserved meat section 13 like drawing 4 — drawing 5 .

[0027] If the sheet thickness  $T$  is larger than 3.0 times and the die length  $L54$  of the crevice 54 of the edge of a blade carries out, it will extend and the part by the heights 53 of the edge of a blade which does not become thinner than the sheet thickness  $T$  without effectiveness's being unable to demonstrate to the interior of a center of the extension section but extending it will be produced. On the other hand, if it is 0.3 or less times, the extension degree depended for extending may be high, and a crack may occur on the top face of the extension section 4.

[0028] if it is desirable for the interlocking maximum width  $W53$  of the heights 53 of the edge of a blade to be 0.3 to 3.0 times the sheet thickness  $T$  and it is 0.3 or less times — push — being large — it is small and extent does not become [ the extension section 4 ] not much thin, but when 3.0 times are exceeded, a possibility that a crack may arise is in the top face of the extension section 4.

[0029] In addition, although the configuration of the cross section of the heights 53 of the edge of a blade of the ruled line cutting edge 5 is shown in drawing 5 , the configuration at a tip as shown in others, drawing 6 — drawing 9 is sufficient as it.

[0030]

[Example] As a sheet plastic 1, the polyethylene terephthalate of amorphism nature with a thickness of 0.25mm is used. Both the die length  $L53$  of the heights 53 of the edge of a blade shown in drawing 4 and drawing 5 as a ruled line cutting edge 5 and the die length  $L54$  of the crevice 54 of the edge of a blade 0.25mm. It was the V type whose  $D$  is about 75 degrees whenever [ tool angle ] as an edge-of-a-blade configuration, height  $H530$  was 0.3mm absolutely, and when [ of the heights 53 of the edge of a blade ] the interlocking height  $H53$  was 0.24mm, that from which the interlocking maximum width  $W53$  of the heights 53 of the edge of a blade is set to about 0.19mm was used.

[0031] Using the above-mentioned ruled line cutting edge 5, place a sheet plastic 1 on a griddle 6, and eat away making the heights 53 of the edge of a blade eat away, and extending the ruled line cutting edge 5 from the upper part, and it presses to the part whose height  $H53$  is 0.24mm. As shown in drawing 2 , when 0.24mm and aperture-width  $W3$  of a deep groove 3 formed the 0.19mm bending ruled line 2, as for the top-face section 41, the extension section 4 became [ the depth  $D3$  of a deep groove 3 ] saddle shape-like, and thickness  $T$  four of the center section 43 of the extension section 4 was set to 0.21mm.

[0032] In this way, it bends, even if it repeats the obtained clinch test of folding up from this condition to the opposite side 360 degrees while it is easily bendable, if it bends and the sheet plastic containing a ruled line is folded up 180 degrees from the bending ruled line 2, 20 times and performs it, and there is also no breakage from a ruled line 2, and it excelled in the balance of the ease of bending, and reinforcement.

[0033] In order to evaluate the ease of bending practical, for example, as shown in drawing 10 The both ends of the blank sheet pierced for the predetermined profile while bending to the

sheet plastic 1 and forming the ruled line 2 It pastes up by the edge left for applying paste 110, and crushes flat. Height A 100mm, Build the tube-like object 10 whose width of face B is 50mm and whose thickness C is 20mm, and an automatic box-producing machine (O-M, Ltd. VCV mold) is used. While causing the crushed tube-like object 10, as a result of performing the box-producing test of bending and stopping the side flap 111 and the lid flap 112, and assembling a box, per minute 60 box producing was possible. In addition, the result same also as an outside also as the inside of a tube-like object 10 came out of the side which put in the ruled line.

[0034]

[Effect of the Invention] This invention is a sheet plastic containing a bending ruled line characterized by for said bending ruled line to prepare much deep grooves and the extension sections in the die-length direction by turns in the sheet plastic containing a bending ruled line, and according to the effectiveness of the extension section, even if especially the sheet containing a bending ruled line of this invention makes thin average wall thickness of the whole ruled line section, a ruled line with good bending nature without the tear and the breakage from the ruled line section is obtained, and the thin and sharp bending section is obtained.

[0035] Moreover, the die length of a deep groove is 3.0 times [ 0.3 times to ] the sheet thickness, and the depth of a deep groove is 1.0 times [ 0.5 times to ] the sheet thickness. the aperture width of a deep groove — a sheet — 0.3 times to 3.0 thick times — it is — the die length of the extension section — a sheet — 0.3 times to 3.0 thick times — it is — the thickness of the extension section — a sheet — by being thickly thinner The sheet plastic containing a bending ruled line which maintained balance with the ease of bending and the difficulty of being generated of a tear or breakage is obtained.

[0036] Moreover, when the configuration of the extension section has the saddle shape-like top-face section, and a sheet plastic is bent and it bends from a ruled line, since each extension section bends after the angle has been round, it does not have a possibility that it may be caught in the fiber of clothing, and its feel is also good.

[0037] And while the edge of a blade pushes against a sheet plastic the bending ruled line cutting edge which has the shape of tothing in the die-length direction, makes the heights of the edge of a blade eat away, extends and forming a deep groove said push — being large — by the manufacture approach of the sheet plastic containing a bending ruled line characterized by extending the sheet-plastic part between the heights of the edge of a blade crosswise, and forming the extension section between deep grooves The bending ruled line which has a deep groove and the extension section can form very easily, and adjustment of the ease of bending or reinforcement is easy. Since thrust strong at the time of processing is not needed, many ruled line cutting edges are used at once, or a ruled line cutting edge and a profile punching cutting edge are attached in one press mold, and it can be processed in large quantities. Since the height of a ruled line cutting edge can process it with the same dimension and separate height adjustment is not needed conventionally like a cutting edge, rationalization of large tuning can be measured, and the precision of a ruled line cutting edge may also be low.

[0038] The edge of a blade has the shape of tothing in the die-length direction. The die length of the heights of the edge of a blade Furthermore, 0.3 to 3.0 times of sheet thickness, The die length of the crevice of the edge of a blade is 0.3 to 3.0 times the sheet thickness, and the interlocking height of the heights of the edge of a blade is 0.5 or more times of sheet thickness. The bending ruled line cutting edge whose interlocking maximum width of the heights of the edge of a blade is 0.3 to 3.0 times the sheet thickness is suitable for outstanding bending and manufacturing the sheet plastic containing a ruled line.

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[Translation done.]



TECHNICAL FIELD

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[Industrial Application] This invention is bent in the sheet plastic containing a bending ruled line, and its manufacture approach row, and relates to a ruled line cutting edge.

PRIOR ART

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[Description of the Prior Art] The sheet plastic containing a bending ruled line used as the material of the assembly case made from plastics forms a groove bending ruled line in the bending part of a flat sheet plastic, and from this part, it is [ a ruled line ] bending-easy and it is carrying out it. The conventional bending ruled line 2 has a method of pressing and bending and forming a ruled line etc., using the thing or the heated ruled line cutting edge of the structure which lessens stress at the time of bending as a slot made into a deep groove 264, a shallow groove part 265, and two steps of depths for the slot 262,263 of one slots [ 261 or 2 ], or a longitudinal direction, or heating the bending part of a sheet plastic by high frequency, as a perspective view is shown in drawing 11 .

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[Translation done.]

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EFFECT OF THE INVENTION

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[Effect of the Invention] This invention is a sheet plastic containing a bending ruled line characterized by for said bending ruled line to prepare much deep grooves and the extension sections in the die-length direction by turns in the sheet plastic containing a bending ruled line, and according to the effectiveness of the extension section, even if especially the sheet containing a bending ruled line of this invention makes thin average wall thickness of the whole ruled line section, a ruled line with good bending nature without the tear and the breakage from the ruled line section is obtained, and the thin and sharp bending section is obtained.

[0035] moreover, the die length of a deep groove — a sheet — 0.3 times to 3.0 thick times — it is — the depth of a deep groove — a sheet — 0.5 times to 1.0 thick times — it is — the aperture width of a deep groove — a sheet — 0.3 times to 3.0 thick times — it is — the die length of the extension section — a sheet — 0.3 times to 3.0 thick times — it is — the thickness of the extension section — a sheet — it is thickly thinner The sheet plastic containing a bending ruled line which maintained balance with the ease of bending and the difficulty of being generated of a tear or breakage is obtained.

[0036] Moreover, when the configuration of the extension section has the saddle shape-like top-face section, and a sheet plastic is bent and it bends from a ruled line, since each extension section bends after the angle has been round, it does not have a possibility that it may be caught in the fiber of clothing, and its feel is also good.

[0037] And it is while forming a deep groove while the edge of a blade pushes against a sheet plastic the bending ruled line cutting edge which has the shape of toothing in the die-length direction, makes the heights of the edge of a blade eat away and extends, said push — being large — by the manufacture approach of the sheet plastic containing a bending ruled line characterized by extending the sheet-plastic part between the heights of the edge of a blade crosswise, and forming the extension section between deep grooves The bending ruled line which has a deep groove and the extension section can form very easily, and adjustment of the ease of bending or reinforcement is easy. Since thrust strong at the time of processing is not needed, many ruled line cutting edges are used at once, or a ruled line cutting edge and a profile punching cutting edge are attached in one press mold, and it can be processed in large quantities. Since the height of a ruled line cutting edge can process it with the same dimension and separate height adjustment is not needed conventionally like a cutting edge, rationalization of large tuning can be measured, and the precision of a ruled line cutting edge may also be low.

[0038] furthermore, the edge of a blade — the die-length direction — the shape of toothing — having — the die length of the heights of the edge of a blade — a sheet — the die length of the crevice of 0.3 to 3.0 thick times, and the edge of a blade — a sheet — 0.3 to 3.0 thick times — it is — the interlocking height of the heights of the edge of a blade — a sheet — the bending ruled line cutting edge whose interlocking maximum width of the heights of the edge of a blade it is 0.5 or more thick times, and is 0.3 to 3.0 times the sheet thickness was excellent — it bends and the sheet plastic containing a ruled line is manufactured It is suitable.

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[Translation done.]

## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, since any slot made into 1 of the former, 2, or two steps of depths presses the whole sheet strongly with the ruled line cutting edge which has an edge-of-a-blade configuration corresponding to the configuration of these slots and makes the slot thin, the molecule in the plastics of a ruled line part is compressed by strong press. The physical-properties reinforcement of the part falls, and a ruled line cannot be put in not much deeply, or although put in deeply, there is a fault which is not bent softly.

[0004] In order to press and process it into the whole with high pressure furthermore, when performing punching processing of many bending ruled lines or a profile to coincidence, while needing big thrust, there is a problem that the sheet plastic between bending ruled lines will curve, and when bending and sticking especially at a subsequent process and carrying out processing etc., there is a fault which one sending [ one ] etc. cannot be performed well and cannot measure automation.

[0005] Moreover, by the ruled line cutting edge which the latter heated, and the approach of using a RF, it is difficult for processing it at high speed to be able to carry out in difficulty, and to be unable to cut, to be unable to heat on the average from the field of heat control, but to make the ruled line depth of the whole case into homogeneity, and physical properties may get worse with heating depending on the sheet quality of the material.

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[Translation done.]

## MEANS

[Means for Solving the Problem] It is the thing of the completely new structure invented in order that this invention might solve the above-mentioned trouble. In the sheet plastic containing a bending ruled line, said bending ruled line is a sheet plastic containing a bending ruled line characterized by preparing much deep grooves and the extension sections in the die-length direction by turns. Especially according to the effectiveness of the extension section Even if the sheet containing a bending ruled line of this invention makes thin average wall thickness of the whole ruled line section, a ruled line with good bending nature without the tear and breakage from the ruled line section is obtained.

[0007] Moreover, the die length of a deep groove is 3.0 times [ 0.3 times to ] the sheet thickness, and the depth of a deep groove is 1.0 times [ 0.5 times to ] the sheet thickness. the aperture width of a deep groove -- a sheet -- 0.3 times to 3.0 thick times -- it is -- the die length of the extension section -- a sheet -- 0.3 times to 3.0 thick times -- it is -- the thickness of the extension section -- a sheet -- by being thickly thinner The sheet plastic containing a bending ruled line which maintained balance with the ease of bending and the difficulty of being generated of a tear or breakage is obtained.

[0008] Moreover, when the configuration of the extension section has the saddle shape-like top-face section, and a sheet plastic is bent and it bends from a ruled line, since each extension section bends after the angle has been round, it does not have a possibility that it may be caught in the fiber of clothing.

[0009] And while the edge of a blade pushes against a sheet plastic the bending ruled line cutting edge which has the shape of toothing in the die-length direction, makes the heights of the edge of a blade eat away, extends and forming a deep groove said push -- being large -- the sheet-plastic part between the heights of the edge of a blade is extended crosswise, and the bending ruled line which has a deep groove and the extension section can form very easily by the manufacture approach of the sheet plastic containing a bending ruled line characterized by forming the extension section between deep grooves.

[0010] The edge of a blade has the shape of toothing in the die-length direction. The die length of the heights of the edge of a blade Furthermore, 0.3 to 3.0 times of sheet thickness, the die length of the crevice of the edge of a blade -- a sheet -- 0.3 to 3.0 thick times -- it is -- the interlocking height of the heights of the edge of a blade -- a sheet -- 0.5 or more thick times -- and Height is larger than said interlocking height absolutely, and the bending ruled line cutting edge whose interlocking maximum width of the heights of the edge of a blade is 0.3 to 3.0 times the sheet thickness is suitable for outstanding bending and manufacturing the sheet plastic containing a ruled line.

[0011] A drawing explains to a detail below.

[0012] The perspective view in which drawing 1 shows an example of the sheet plastic containing a bending ruled line of this invention, Drawing 2 is the II-II line sectional view of drawing 1, and drawing 3 is III-III of drawing 1. Line sectional view, The transverse-plane sectional view where drawing 4 explains the manufacture approach of the sheet plastic containing a bending ruled line of this invention, and a bending ruled line cutting edge, Drawing 5 is V-V of drawing 4. A sectional view, the side-face sectional view in which drawing 6 - drawing 9 show other examples of the bending ruled line cutting edge of this invention, The perspective view and drawing 11 which show an example of the tube-like object with which drawing 10 consists of a sheet plastic containing a bending ruled line of this invention are the perspective view showing an example of the conventional sheet plastic containing a bending ruled line.

[0013] It is the sheet plastic containing a bending ruled line characterized by having bent the sheet plastic containing a bending ruled line of this invention as shown in drawing 1 - drawing 3, and said bending ruled line 2 preparing much deep grooves 3 and the extension sections 4 in the die-length direction by turns in the sheet plastic 1 containing a ruled line.

[0014] In this invention, a sheet plastic 1 is a thing with a thickness of about 0.1-3.0mm, and the

half-hard and the hard sheet which consist of simple substances of \*\*, such as a polyvinyl chloride, polyethylene terephthalate, polypropylene, polystyrene, a polycarbonate, and polyethylene, composite with paper, the composite of plastics and other plastics, etc. can be used for the quality of the material. Furthermore a nonwoven fabric etc. is processible, and it is good if extension is possible in short.

[0015] It is formed by turns and a deep groove 3 has the operation which makes the bending ruled line 2 soft, and if the die length L3 is enlarged, it will become easy to bend the deep groove 3 and the extension section 4 which form the bending ruled line 2. The extension section 4 has the operation which the deep groove 3 faces across order, bends, and holds the reinforcement of a ruled line 2.

[0016] Moreover, as shown in drawing 2 and drawing 3, the die length L3 of a slot 3 is 3.0 times [ 0.3 times to ] the sheet thickness T. The depth D3 of a deep groove 3 is 1.0 times [ 0.5 times to ] the sheet thickness T, and aperture-width W3 of a deep groove 3 is 3.0 times [ 0.3 times to ] the sheet thickness T. The die length L4 of the extension section 4 is 3.0 times [ 0.3 times to ] the sheet thickness T, and thickness T four of balance of the difficulty of being generated of the ease of bending, a tear, or breakage of the extension section 4 improves further by being thinner than the sheet thickness T.

[0017] Moreover, as shown in drawing 1 and drawing 2, when the configuration of the extension section 4 has the saddle shape-like top-face section 41 When a sheet plastic 1 is bent and it bends from a ruled line 2 so that a surface part 41 may besides bend and it may come outside Since the location of bending is stabilized in the thin range of the thinnest part 43 of a saddle shape-like center, it has an operation that a bend line is not conspicuous, while it does not have a possibility that it may be caught in the fiber of clothing etc., since each extension section 4 bends after the angle 42 before and behind the top-face section 41 has been round.

[0018] As shown in drawing 4 - drawing 5, in order to process the sheet plastic containing a bending ruled line of this invention While the edge of a blade pushes against a sheet plastic 1 the bending ruled line cutting edge 5 which has the shape of toothing in the die-length direction, makes the heights 53 of the edge of a blade eat away, extends and forming a deep groove 3 said push -- being large -- by the manufacture approach of the sheet plastic containing a bending ruled line characterized by extending the sheet-plastic part 14 between the heights 53 of the edge of a blade crosswise, and forming the extension section 4 between deep grooves 3 The bending ruled line 2 which has a deep groove 3 and the extension section 4 can form very easily.

[0019] When the cradle 6 which consists of a griddle etc. is installed in the bottom of a sheet plastic 1 and the edge of a blade pushes the bending ruled line cutting edge 5 which has the shape of toothing in the die-length direction from the upper part of this sheet plastic 1, the bending ruled line 2 is obtained.

[0020] If the interlocking maximum width W53 of the heights 53 of the edge of a blade and the interlocking height H53 of the heights 53 of the edge of a blade become large, aperture-width W3 of the top-face section of a deep groove 3 will become large, the extension section 4 is extended greatly and the thickness T four in drawing 2 becomes small.

[0021] It will be hard to bend, if the interlocking maximum width W53 of the heights 53 of the edge of a blade is too small, the extension section 4 is not extended and the thickness T four does not become small. If it enlarges on the other hand too much, the pressure beyond the need will join a sheet at the time of press processing, the ruled line section may become hard, or the rate of extension of the extension section 4 increases too much, and a crack may occur in the top-face section 41.

[0022] The configuration of the top-face section 41 of the extended extension section 4 can be made into the shape of a saddle shape. push according [ this ] to interlocking of the heights 53 of the edge of a blade -- being large -- if the sheet-plastic part 14 between the heights 53 of the edge of a blade is because there is nothing and meat is dragged by the cross direction by the heights tip near a center only by being extended crosswise and plastics is generally extended -- thickness -- thin -- becoming -- more -- bending -- being easy -- tensile strength improves by extension, it bends, and a ruled line 2 stops being torn easily

[0023] The sheet plastic 1 between the bending ruled lines 2 seems not to curve with press stress furthermore, while the ruled line cutting edge 5 is processible by small thrust since the heights 53 of the edge of a blade only press a deep groove 3, bend the crevice 54 of the edge of a blade, without touching the extension section 4, and can form a ruled line 2, and the bending ruled line 2 is not pressed partially.

[0024] It is the structure by which a bending [ of a ruled line ] easy is comparatively stabilized even if unevenness is in the thickness of a sheet plastic 1, since there is an inclination which it extends while, as for the thick part of a sheet plastic 1, the heights 53 of the edge of a blade enter deeply, and the thickness of the extension section 4 becomes small greatly [ effectiveness ], and becomes easy to bend.

[0025] The edge of a blade has the shape of toothing in the die-length direction. The die length L53 of the heights 53 of the edge of a blade The die length L54 of 0.3 to 3.0 times of the sheet thickness T and the crevice 54 of the edge of a blade 0.3 to 3.0 times of the sheet thickness T — it is — the interlocking height H53 of the heights 53 of the edge of a blade — 0.5 or more times of the sheet thickness T — and Height H530 eats away absolutely, it is larger than height H53, and the bending ruled line cutting edge 5 whose interlocking maximum width W53 of the heights 53 of the edge of a blade is 0.3 to 3.0 times the sheet thickness T is suitable for outstanding bending and manufacturing the sheet plastic containing a ruled line.

[0026] if the interlocking height H53 of the heights 53 of the edge of a blade is 0.5 or more times of the sheet thickness T, while being easy to bend — push — being large — the extension section 4 can be formed. moreover — since it is larger than height H53, also when [ of the heights 53 of the edge of a blade ] height H530 ate away absolutely, and it presses to the interlocking height H53, without the base 541 of the crevice 54 of the edge of a blade touches — only — push — being large — since the extension section 4 can be formed, the thrust by the edge of a blade can be prevented from joining the extension section 4 In this case, the large interlocking height H53 is taken, the heights 53 of the edge of a blade can be made to be able to eat away over the whole sheet thickness T, and it can also puncture, and on the other hand, when requiring sealing performance, there is also a method of leaving the reserved meat section 13 like drawing 4 — drawing 5 .

[0027] If the sheet thickness T is larger than 3.0 times and the die length L54 of the crevice 54 of the edge of a blade carries out, it will extend and the part by the heights 53 of the edge of a blade which does not become thinner than the sheet thickness T without effectiveness's being unable to demonstrate to the interior of a center of the extension section but extending it will be produced. On the other hand, if it is 0.3 or less times, the extension degree depended for extending may be high, and a crack may occur on the top face of the extension section 4.

[0028] if it is desirable for the interlocking maximum width W53 of the heights 53 of the edge of a blade to be 0.3 to 3.0 times the sheet thickness T and it is 0.3 or less times — push — being large — it is small and extent does not become [ the extension section 4 ] not much thin, but when 3.0 times are exceeded, a possibility that a crack may arise is in the top face of the extension section 4.

[0029] In addition, although the configuration of the cross section of the heights 53 of the edge of a blade of the ruled line cutting edge 5 is shown in drawing 5 , the configuration at a tip as shown in others, drawing 6 — drawing 9 is sufficient as it.

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[Translation done.]

## EXAMPLE

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[Example] As a sheet plastic 1, the polyethylene terephthalate of amorphism nature with a thickness of 0.25mm is used. Both the die length L53 of the heights 53 of the edge of a blade shown in drawing 4 and drawing 5 as a ruled line cutting edge 5 and the die length L54 of the crevice 54 of the edge of a blade 0.25mm, It was the V type whose D is about 75 degrees whenever [ tool angle ] as an edge-of-a-blade configuration, height H530 was 0.3mm absolutely, and when [ of the heights 53 of the edge of a blade ] the interlocking height H53 was 0.24mm, that from which the interlocking maximum width W53 of the heights 53 of the edge of a blade is set to about 0.19mm was used.

[0031] Using the above-mentioned ruled line cutting edge 5, place a sheet plastic 1 on a griddle 6, and eat away making the heights 53 of the edge of a blade eat away, and extending the ruled line cutting edge 5 from the upper part, and it presses to the part whose height H53 is 0.24mm. As shown in drawing 2, when 0.24mm and aperture-width W3 of a deep groove 3 formed the 0.19mm bending ruled line 2, as for the top-face section 41, the extension section 4 became [ the depth D3 of a deep groove 3 ] saddle shape-like, and thickness T four of the center section 43 of the extension section 4 was set to 0.21mm.

[0032] In this way, it bends, even if it repeats the obtained clinch test of folding up from this condition to the opposite side 360 degrees while it is easily bendable, if it bends and the sheet plastic containing a ruled line is folded up 180 degrees from the bending ruled line 2, 20 times and performs it, and there is also no breakage from a ruled line 2, and it excelled in the balance of the ease of bending, and reinforcement.

[0033] In order to evaluate the ease of bending practical, for example, as shown in drawing 10 The both ends of the blank sheet pierced for the predetermined profile while bending to the sheet plastic 1 and forming the ruled line 2 It pastes up by the edge left for applying paste 110, and crushes flat. Height A 100mm, Build the tube-like object 10 whose width of face B is 50mm and whose thickness C is 20mm, and an automatic box-producing machine (O-M, Ltd. VCV mold) is used. While causing the crushed tube-like object 10, as a result of performing the box-producing test of bending and stopping the side flap 111 and the lid flap 112, and assembling a box, per minute 60 box producing was possible. In addition, the result same also as an outside also as the inside of a tube-like object 10 came out of the side which put in the ruled line.

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[Translation done.]



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## DESCRIPTION OF DRAWINGS

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### [Brief Description of the Drawings]

[Drawing 1] The perspective view showing an example of the sheet plastic containing a bending ruled line of this invention

[Drawing 2] The II-II line sectional view of drawing 1

[Drawing 3] III-III of drawing 1 Line sectional view

[Drawing 4] The transverse-plane sectional view explaining the manufacture approach of the sheet plastic containing a bending ruled line of this invention, and a bending ruled line cutting edge

[Drawing 5] V-V of drawing 4 Sectional view

[Drawing 6] The side-face sectional view showing other examples of the bending ruled line cutting edge of this invention

[Drawing 7] The side-face sectional view showing other examples of the bending ruled line cutting edge of this invention

[Drawing 8] The side-face sectional view showing other examples of the bending ruled line cutting edge of this invention

[Drawing 9] The side-face sectional view showing other examples of the bending ruled line cutting edge of this invention

[Drawing 10] The perspective view showing an example of the tube-like object which consists of a sheet plastic containing a bending ruled line of this invention

[Drawing 11] The perspective view showing an example of the conventional sheet plastic containing a bending ruled line

### [Description of Notations]

1 Sheet Plastic

2 Bending Ruled Line

3 Deep Groove

L3 The die length of a deep groove

D3 The depth of a deep groove

W3 Opening of a deep groove

4 Extension Section

41 Top-Face Section

L4 The die length of the extension section

5 Ruled Line Cutting Edge

53 Heights of Edge of a Blade

L53 The die length of the heights of the edge of a blade

H53 Interlocking height of the heights of the edge of a blade

H530 The heights of the edge of a blade are height absolutely.

W53 The interlocking maximum width of the heights of the edge of a blade

54 Crevice of Edge of a Blade

L54 The die length of the crevice of the edge of a blade

T Sheet thickness

T four Thickness of the extension section

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[Translation done.]

## \* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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CORRECTION OR AMENDMENT

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[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law

[Section partition] The 4th partition of the 2nd section

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[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] Claim

[Method of Amendment] Modification

[Proposed Amendment]

[Claim(s)]

[Claim 1] It is the sheet plastic containing a bending ruled line characterized by said bending ruled line preparing much deep grooves and the extension sections in the die-length direction by turns in the sheet plastic containing a bending ruled line.

[Claim 2] the die length of a deep groove — a sheet — 0.3 to 3.0 thick times — it is — the depth of a deep groove — a sheet — 0.5 to 1.0 thick times — it is — the aperture width of a deep groove — a sheet — 0.3 to 3.0 thick times — it is — the die length of the extension section — a sheet — 0.3 to 3.0 thick times — it is — the thickness of the extension section — a sheet — the sheet plastic containing a bending ruled line according to claim 1 characterized by being thickly thinner.

[Claim 3] The sheet plastic containing a bending ruled line according to claim 1 characterized by the configuration of the extension section having the saddle shape-like top-face section.

[Claim 4] while the edge of a blade pushes against a sheet plastic the bending ruled line cutting edge which has the shape of toothing in the die-length direction, makes the heights of the edge of a blade eat away, extends and forming a deep groove — said push — being large — the manufacture approach of the sheet plastic containing a bending ruled line characterized by extending the sheet-plastic part between the heights of the edge of a blade crosswise, and forming the extension section between deep grooves.

[Claim 5] the edge of a blade — the die-length direction — the shape of toothing — having — the die length of the heights of the edge of a blade — a sheet — the die length of the crevice of 0.3 to 3.0 thick times, and the edge of a blade — a sheet — 0.3 to 3.0 thick times — it is — the interlocking height of the heights of the edge of a blade — a sheet — 0.5 or more thick times — and the bending ruled line cutting edge of the sheet plastic whose interlocking maximum width of the heights of the edge of a blade height is larger than said interlocking height absolutely, and is 0.3 to 3.0 times the sheet thickness.

[Claim 6] The case made from plastics which pierces a sheet plastic given in any of claims 1-3 they are for a predetermined profile, and bends and comes to assemble this.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0007

[Method of Amendment] Modification

[Proposed Amendment]

[0007] Moreover, the die length of a deep groove is 0.3 to 3.0 times the sheet thickness, and the depth of a deep groove is 0.5 to 1.0 times the sheet thickness. The aperture width of a deep groove is 0.3 to 3.0 times the sheet thickness, and the die length of the extension section is 0.3 to 3.0 times the sheet thickness, and the thickness of the extension section by being thinner than sheet thickness The sheet plastic containing a bending ruled line which maintained balance with the ease of bending and the difficulty of being generated of a tear or breakage is obtained.

[Procedure amendment 4]

[Document to be Amended] Specification

[Item(s) to be Amended] 0011

[Method of Amendment] Modification

[Proposed Amendment]

[0011] It becomes the material of the assembly case made from plastics, the sheet plastic containing a bending ruled line of the above-mentioned configuration pastes up both ends by the edge left for applying paste while it pierces a sheet plastic on the blank sheet of the predetermined profile which has an edge left for applying paste and a flap and bends this blank sheet, and if a flap is bent and closed, it will serve as a case. Hereafter, a drawing explains to a detail.

[Procedure amendment 5]

[Document to be Amended] Specification

[Item(s) to be Amended] 0016

[Method of Amendment] Modification

[Proposed Amendment]

[0016] Moreover, as shown in drawing 2 and drawing 3, the die length L3 of a deep groove 3 is 0.3 to 3.0 times the sheet thickness T. The depth D3 of a deep groove 3 is 0.5 to 1.0 times the sheet thickness T, and aperture-width W3 of a deep groove 3 is 0.3 to 3.0 times the sheet thickness T. The die length L4 of the extension section 4 is 0.3 to 3.0 times the sheet thickness T, and thickness T four of balance of the difficulty of being generated of the ease of bending, a tear, or breakage of the extension section 4 improves further by being thinner than the sheet thickness T.

[Procedure amendment 6]

[Document to be Amended] Specification

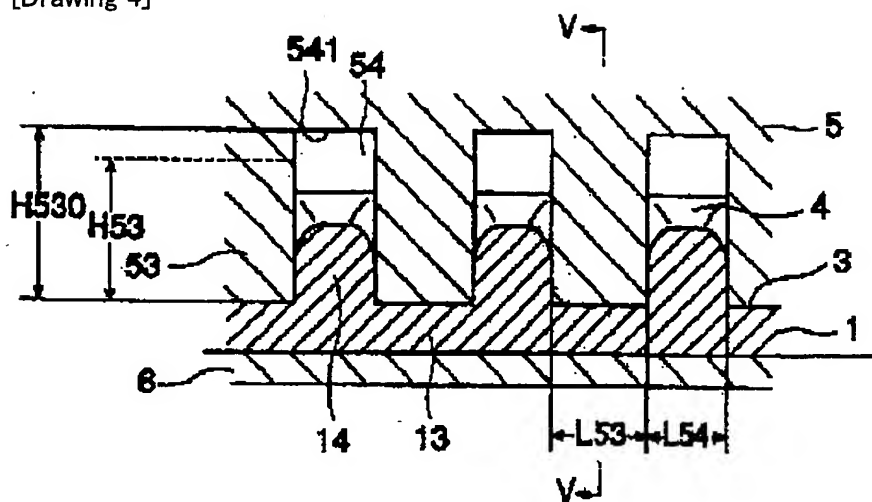
[Item(s) to be Amended] 0035

[Method of Amendment] Modification

[Proposed Amendment]

[0035] Moreover, the die length of a deep groove is 0.3 to 3.0 times the sheet thickness, and the depth of a deep groove is 0.5 to 1.0 times the sheet thickness. The aperture width of a deep groove is 0.3 to 3.0 times the sheet thickness, and the die length of the extension section is 0.3 to 3.0 times the sheet thickness, and when the sheet thick twist is also thin, the thickness of the extension section The sheet plastic containing a bending ruled line which maintained balance with the ease of bending and the difficulty of being generated of a tear or breakage is obtained.

[Procedure amendment 7]  
[Document to be Amended] DRAWINGS  
[Item(s) to be Amended] drawing 4  
[Method of Amendment] Modification  
[Proposed Amendment]  
[Drawing 4]



[Translation done.]